Section 5. 510(k) Summary of Safety and Effectiveness

DEC. 2 1 2010

This 510(k) summary of safety and effectiveness is being submitted in accordance with the requirements of SMDA 1990 and 21 CFR 807.92.

The assigned 510(k) number is: K102242

1. Sponsor/Applicant Name and Address

Company Name:	Genzyme Diagnostics
Address:	31 New York Avenue Framingham, MA 01701-9322
Telephone:	508-661-1154
Contact Person:	Carol C. Ryerson Director, Regulatory Affairs
Date Summary Prepared:	08/05/2010

2. Device Name and Classification

Trade Name:	OSOM C. difficile Toxin A/B Test
Classification of Device:	21 CFR 866.2660 Microorganism differentiation and identification device; reagents, *Clostridium difficile* toxin
Product Code:	LLH
Classification:	Class I

3. Predicate Device

K041951 – Remel Xpect® Clostridium difficile Toxin A/B

4. Device Description

The OSOM C. difficile Toxin A/B Test is a rapid test which can detect the presence of *Clostridium difficile* toxins A and B in human stool samples. A test kit contains 25 OSOM test stick devices and 25 disposable pipettes. The OSOM C. difficile Toxin A/B Test is a qualitative assay that employs immunochromatographic, dipstick technology. The test format is a sandwich immunoassay, with a single test zone on the nitrocellulose dipstick to detect Toxin A and/or Toxin B ("blue/gray" line) and a single control line zone to indicate proper sample flow ("red" line). The test procedure involves binding of *C. difficile* Toxin A and/or Toxin B from a patient stool sample to blue colored latex particles conjugated to a monoclonal antibody against Toxin B or a polyclonal antibody against Toxin A. When Toxin A and/or B is present in the sample, it will form a partial immune complex with the antibody-conjugated colored particles. The OSOM C. difficile Toxin A/B Test stick, when placed in the sample mixture, initiates sample migration along the nitrocellulose membrane. If *C. difficile* toxin A or toxin B is present, a blue/gray line will appear in the test line region indicating a positive result. A red control line must appear for the results to be valid. If *C. difficile* toxins are not present, only the red control line will appear. An invalid test occurs when no control line appears.

5. Intended Use

The OSOM C. difficile Toxin A/B Test is an immunochromatographic assay intended for the qualitative detection of *Clostridium difficile* toxins A and/or B in human stool samples. This test is intended as an aid in the diagnosis of *C. difficile*-associated disease (CDAD) in patients with symptoms of CDAD.

6. Comparison to Predicate Device

The Table below provides a summary of the device characteristics for the OSOM C. difficile Toxin A/B Test and the predicate device.

Table 1: Comparison of Technological Characteristics of Genzyme OSOM C. difficile Toxin A/B Test with Legally Marketed Device

Device Characteristics	OSOM C. difficile Toxin A/B Test [New Device]	Remel Xpect C. difficile Toxin A/B test [Predicate/ K041951]
Intended Use	An immunochromatographic assay intended for the qualitative detection of *Clostridium difficile* toxins A and/or B in human stool samples. Intended as an aid in the diagnosis of *Clostridium difficile*-associated disease (CDAD) in patients with symptoms of CDAD.	A rapid in vitro immunochromatographic test for the direct, qualitative detection of *Clostridium difficile* Toxin A and/or B in human fecal specimens from patients suspected of having *Clostridium difficile*-associated disease (CDAD). Intended for use as an aid in diagnosis of CDAD.
Specifically detecting:	Qualitative *C. Difficile* Toxin A/B	Qualitative - *C. Difficile* Toxin A/B
Specimen	Human fecal specimen	Human fecal specimen
Assay Method	Immunochromatographic dipstick technology	Immunochromatographic membrane assay
Antibodies	Capture: goat polyclonal anti-Toxin A and rabbit polyclonal anti-Toxin B Detection: goat polyclonal anti-Toxin A and mouse monoclonal anti-Toxin B	Capture: mouse anti-Toxin A and rabbit anti-Toxin B Detection: Biotinylated goat anti-Toxin A and rabbit anti-Toxin B
Sample Volume	Solid stool: pea-sized portion using applicator stick provided Liquid stool: 0.05 mL	Solid stool: 0.2g Liquid stool: 0.2 mL
Assay Time	20 minutes	20 minutes

7. Summary of Performance Data

Clinical Performance. A clinical trial was conducted at five sites in the United States to establish the clinical sensitivity and clinical specificity of the OSOM C. difficile Toxin A/B Test in detecting *Clostridium difficile* toxins A and/or B in human stool samples. Qualitative results obtained using the OSOM C. difficile Toxin A/B Test were compared with those determined by cytotoxicity assay.

De-identified excess loose or watery stool specimens were obtained from patients at or over the age of 18 years whose stool specimen had been submitted to the laboratory for *C. difficile*-associated disease (CDAD) testing. Specimens were tested with the OSOM C. difficile Toxin A/B Test within 72 hours of receipt. The cytotoxicity assay was performed at Genzyme using a standard *C. difficile* toxin cytotoxicity assay. Those performing the cytotoxicity assay testing were blinded to the OSOM test results.

The total incidence rate observed in this study for *C. difficile* associated disease (CDAD) based on the cytotoxicity assay results was 8.0% (102/ 1274). The overall sensitivity, specificity and accuracy of the OSOM test compared to cytotoxicity assay are shown in the table below.

Table 2: OSOM C. difficile Toxin A/B Test Performance vs. Cytotoxicity Assay

		Cytotoxin		Total
		+	-	
OSOM® C. difficile Toxin A/B Test	+	90	37	127
	-	12	1135	1147
Total		102	1172	1274
Sensitivity: 90/102 = 88.2% (95% CI, 80.5 - 93.1%)				
Specificity: 1135/1172 = 96.8% (95% CI, 95.7 - 97.7%)				
Agreement: 1225/1274 = 96.2% (95% CI, 95.1 - 96.9%)				

Discrepant testing was performed with a commercially available PCR-based molecular method which detects the tcdB gene. Note this PCR method does not detect biologically active protein or Toxin A gene. Twelve of twelve specimens that were cytotoxin positive and OSOM C. difficile

Toxin A/B negative were positive for the presence of tcdB gene. Of the 37 specimens that were cytotoxin negative and OSOM C. difficile Toxin A/B positive, 30 of 36 were negative for the tcdB gene, 6 were positive for the tcdB gene, 1 specimen was not available for testing by PCR.

Performance of OSOM C. difficile Toxin A/B Test and the Predicate Device Compared to Cytotoxicity Assay .

The performance of the OSOM C. difficile Toxin A/B Test and a commercially available predicate device were compared to cytotoxicity assay results (see Table 3). All immunoassay device testing was performed at a clinical trial site. A total of 250 paired sample results (OSOM and Predicate Device) were included in this comparison. The performance of the Predicate Device and OSOM tests were compared to the results from the cytotoxicity assay.

Table 3: Performance of OSOM C. difficile Toxin A/B Test and a Commercially Available Lateral Flow Assay Compared to Cytotoxicity Assay (CTA)

		Cytotoxin		Total
		+	-	
OSOM C. difficile Toxin A/B Test	+	42	20	62
	-	6	182	188
	Total	48*	202	250

Sensitivity: 87.5% (42/48; 95% CI, 75.3 - 94.1%)
Specificity: 90.1% (182/202; 95% CI, 85.2 - 93.5%)

* 1 sample gave an invalid OSOM test result with the frozen sample – no internal control line appeared even on repeat; included in the analysis as an incorrect result for purposes of comparison.

		Cytotoxin		Total
		+	-	
Predicate Device	+	34	5	39
	-	14	197	211
	Total	48	202	250

Sensitivity: 70.8% (34/48; 95% CI, 56.8 - 81.8%)
Specificity: 97.5% (197/202; 95% CI, 94.3 - 98.9%)

Analytical Sensitivity. The OSOM C. difficile Toxin A/B Test detected 15 ng/mL for Toxin A and 40 ng/mL Toxin B. These studies were conducted with three representative lots of the OSOM C. difficile Toxin A/B Test using a serial dilution series prepared from purified *C. difficile* toxin A and toxin B in a buffer matrix.

Cross-Reactivity. The OSOM C. difficile Toxin A/B Test was evaluated with bacterial and viral isolates. All testing was performed in a diarrhea matrix except where noted. Cross-reactivity testing was performed with materials obtained from ATCC. Bacterial isolates were tested at a concentration of 10^8 cfu/mL except where noted. All viruses were cultured to ensure viability and tested at the specified concentrations. All bacteria listed gave negative responses. All viruses listed produced negative responses.

Table 3: Organisms tested at 10^8 cfu/mL except where noted

Aeromonas hydrophila	*Escherichia coli*
Bacillus cereus	*Escherichia coli sero:0157*
Bacillus subtilis	*Escherichia coli type 0124:NM (ETEC)*
Bacteroides fragilis	*Escherichia coli type o78:k80:h12 (EIEC)*
Campylobacter coli	*Giardia lamblia* [2]
Campylobacter fetus	*Helicobacter pylori*
Campylobacter jejuni	*Klebsiella pneumoniae*
Candida albicans	*Peptostreptococuss anaerobius*
Clostridium difficile (non-toxigenic)	*Porphyromonas asaccharolytica*
Clostridium beijerinckii	*Proteus vulgaris*
Clostridium haemolyticum	*Pseudomonas aeruginosa*
Clostridium histolyticum	*Salmonella typhimurium*
Clostridium novyi	*Serratia liquefaciens*
Clostridium perfringens [3]	*Shigella dysenteriae* [2]
Clostridium septicum	*Shigella flexneri*
Clostridium sordellii	*Shigella sonnei*
Clostridium sporogenes	*Staphylococcus aureus (Cowan's serotype 1)*
Clostridium tetani	*Staphylococcus aureus*
Cryptosporidium parvum [1]	*Staphylococcus epidermidis*
Enterobacter aerogenes	*Vibrio cholerae* [3]
Enterobacter cloacae	*Vibrio parahaemolyticus*
Enterococcus faecalis	*Yersinia enterocolitica*

[1] Tested at 0.91×10^6 cfu/mL

[2] Tested at 1×10^6 cfu /mL

[3] Tested 1×10^8 cfu /mL in a buffer matrix

Table 4: Viruses tested at specified concentrations

	$TCID_{50}$/mL
Human adenovirus 40 (strain Dugan)	5.25×10^4
Human coxsackievirus B4 (strain J.V.B)	2.34×10^4
Human cytomegalovirus (strain Towne)	1.86×10^2
Human echovirus 22 (strain Harris)	4.79×10^6
Human enterovirus 69 (strain Toluca – 1)	9.55×10^4
Human rotavirus (strain HRV-408)	1.62×10^2

Interfering Substances. The following potential interferents were tested and were found to have no effect on the performance of the OSOM C. difficile Toxin A/B Test.

Table 5: Exogenous Substances

Potential Interferent	Concentration
Barium sulfate	5% w/v
Fecal fat	5% w/v
Hemorrhoidal Cooling Gel	5% v/v
Imodium® AD caplets	5% w/v
Kaopectate®	5% v/v
KY Jelly	5% v/v
Metronidazole	0.25% w/v
Mucin	3.5 % w/v
Pepto Bismol®	5% v/v
Vancomycin	0.25% w/v
Whole blood	40% v/v

Reproducibility. Reproducibility studies were performed by two laboratory personnel per day at two external clinical laboratories and one internal site, on a coded panel that contained synthetic stool samples representing both negative and positive *C. difficile* Toxin A and Toxin B samples. Testing occurred twice per day over a period of 5 days for 120 total test results for each of the three sites. Each operator tested a coded panel of 12 samples: 3 negative samples, 3 high negative samples, 3 low positive samples and 3 moderate positive samples. The OSOM C. difficile Toxin A/B Test gave the expected result 99.2% (357/360) of the time.

8. Conclusion

The information presented in this Premarket Notification demonstrates the performance of the OSOM C. difficile Toxin A/B Test for use with human stool samples is substantially equivalent in intended use, technological characteristics, and performance to the predicate device, thereby supporting 510(k) clearance.

Equivalence was demonstrated using manufactured reagents along with patient and quality control samples containing *C. difficile* toxins A and B.

The studies in this submission demonstrate the substantial equivalence of the OSOM C. difficile Toxin A/B Test to products already marketed for the qualitative detection of *Clostridium difficile* in human stool specimens.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
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Silver Spring, MD 20993

Genzyme Diagnostics
c/o Ms. Carol C. Ryerson
Director, Regulatory Affairs
31 New York Avenue
Framingham, MA 01701-9322

DEC 2 1 2010

Re: k102242
Trade/Device Name: OSOM *C. difficile* Toxin A/B Test
Regulation Number: 21 CFR 866.2660
Regulation Name: Microorganism differentiation and identification device
Regulatory Class: Class I
Product Code: LLH
Dated: December 8, 2010
Received: December 9, 2010

Dear Ms. Ryerson:

We have reviewed your Section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration.

If your device is classified (see above) into class II (Special Controls), it may be subject to such additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 898. In addition, FDA may publish further announcements concerning your device in the Federal Register.

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Parts 801 and 809); medical device reporting (reporting of medical device-related adverse events) (21 CFR 803); good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820); and, if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR 1000-

electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR 1000-1050. This letter will allow you to begin marketing your device as described in your Section 510(k) premarket notification. The FDA finding of substantial equivalence of your device to a legally marketed predicate device results in a classification for your device and thus, permits your device to proceed to the market.

If you desire specific advice for your device on our labeling regulation (21 CFR Part 801 and 809), please contact the Office of *In Vitro* Diagnostic Device Evaluation and Safety at (301) 796-5450. Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR Part 807.97). For questions regarding the reporting of adverse events under the MDR regulation (21 CFR Part 803), please go to http://www.fda.gov/MedicalDevices/Safety/ReportaProblem/default.htm for the CDRH's Office of Surveillance and Biometrics/Division of Postmarket Surveillance.

You may obtain other general information on your responsibilities under the Act from the Division of Small Manufacturers, International and Consumer Assistance at its toll-free number (800) 638-2041 or (301) 796-7100 or at its Internet address http://www.fda.gov/cdrh/industry/support/index.html.

Sincerely yours,

Sally A. Hojvat, M.Sc., Ph.D.
Director
Division of Microbiology Devices
Office of *In Vitro* Diagnostic Device Evaluation and Safety
Center for Devices and Radiological Health

Enclosure

Indications for Use

DEC 2 1 2010

510(k) Number (if known): K102242

Device Name: OSOM C. difficile Toxin A/B Test

Indications For Use:

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Prescription Use X AND/OR Over-The-Counter Use _____
(Part 21 CFR 801 Subpart D) (21 CFR 807 Subpart C)

(PLEASE DO NOT WRITE BELOW THIS LINE-CONTINUE ON ANOTHER PAGE IF NEEDED)

Concurrence of CDRH, Office of In Vitro Diagnostic Devices (OIVD)

Division Sign-Off — acting Associate Director for Freddie Poole

Office of In Vitro Diagnostic Device
Evaluation and Safety

K102242